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PAUL HARRIS OBSERVATIONS ON GRAPHITE



Syrah Resources anode quality graphite processing images

Graphite is a workhorse industrial mineral and the unsung hero of lithium-ion batteries, where it is about 68% by weight of the anode (a blend of synthetic and natural graphite in proportions ranging from 50:50 to 85:15). While graphite is not as rare as some other critical minerals, having the right qualities and characteristic is essential for high-end applications.

The graphite market is forecast to grow from about 3.5Mtpy to about 6Mtpy by 2030 with natural graphite demand set to double, fueled by lithium-ion battery growth and industrial uses. As with many other mineral products, production has been dominated by low-cost Chinese production, which has seen the curtailment of Western production despite repeated moves by North American companies over many years to seek tariff protection.

The US Department of Commerce initiated an investigation under s232 of the Trade Expansion Act of 1962 into graphite pricing and whether imports threaten national security, and in July concluded that China is dumping graphite on US markets. Consequently, its exports of active anode materials will be subject to an antidumping tariff of 93.5%.

The need for North American production became clear in December investigation under s232 of the Trade Expansion Act of 1962 into graphite pricing and whether imports threaten national security, and in July concluded that China is dumping graphite on US markets. Consequently, its exports of active anode materials will be subject to an antidumping tariff of 93.5%. In 2023, China imposed export restrictions on 99.5% high-purity graphite, and later, in October 2025, on 99% high-purity graphite and synthetic graphite. This was to, “close the gap between anything that is a lithium-ion battery input and the actual battery itself, from raw material to end product. This will have wide-ranging consequences,” Rita Adiani, CEO of Titan Mining told SiC & More.

It is not just EVs where graphite batteries are used. From a national perspective, lithium-ion batteries power battlefield weaponry from drones to main battle tanks to submarines, in addition to energy storage applications, and industrial applications from refractories to lubricants.

In addition to Chinese production, prospective Western graphite producers face the additional threat of the oil companies eyeing their ability to compete, echoing a similar intent in the lithium space. For example, ExxonMobil announced the acquisition of Superior Graphite in September 2025 to further its intent to use carbon-intensive feedstocks from its refining processes to produce synthetic graphite. Similarly, it is working on lithium extraction in Arkansas from brine.

With China also dominating graphite processing, a further challenge for Western graphite producers is advancing up the processing learning curve. China produces 80% of natural graphite concentrate, 99% of spherical purified graphite and 97% of natural graphite battery anode material, which means most of the knowledge to produce such products is also in China. The implications of this can be seen with Sy-

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rah Resources, which has yet to get its Vidalia active anode material facility in Louisiana operating as planned, and product qualification timelines continue to be extended.

Pricing

With Chinese graphite products setting pricing in the world market, obtaining pricing that enables Western operations to be economically sustainable is a challenge. "There are five-to-seven natural graphite developers that cannot finance their projects because China prices are below the incentive price," Matt Fernley, editor of *Battery Materials Review* told SiC & More.

The US government is providing grants and loans to help stimulate production. In January 2025, Syrah was awarded a tax credit of about US$165 million by the US Internal Revenue Service under the US Inflation Reduction Act to support the potential expansion of Vidalia. This followed a $150 million loan facility in late 2024 from the US International Development Finance Corporation to support its Balama graphite operation in Mozambique. The Department of War provided $3.2 million to South Star Battery Metals to advance a feasibility study as part of a plan to construct a downstream battery-grade processing facility at its BamaStar graphite project in Alabama and support domestic US production of coated spherical purified graphite.

More recently, zinc miner Titan Mining obtained an agreement for up to $120 million in financing from US Exim for its Empire State mine in New York. Titan aims to make a construction decision on a natural graphite processing facility at its Kilbourne project near Empire State by the end of 2026.

Another prospective US producer is Graphite One, which has a reserve of 71.2Mt at an average diluted grade of 5.2% graphite, containing 3.7Mt of graphite at its Graphite Creek project in Alaska, the largest flake graphite deposit in the US. An April 2025 feasibility study envisioned the production of 48,000tpy of anode active material (AAM) by 2028 at a facility proposed to be constructed in Ohio following $4.1 billion in initial and sustaining capital expenditure. Graphite concentrate from the Graphite Creek mine will commence in 2030, with AAM output to increase to 169,000tpy by 2031. The AMM products will be coated, spherical natural graphite, blended natural and artificial graphites, secondary particle natural graphite, and secondary particle composite.

In Canada, Northern Graphite aims to become the first vertically integrated mine-to-battery materials graphite company. It reopened its Lac des Iles mine in Quebec in January 2025, which aims to produce 25,000tpy from measured and indicated (M&I) resources of 213,000t. It aims to produce 44,000tpy from its Bisset Creek development project in Ontario, Canada, which has 1.2Mt of M&I resources, and 31,000tpy from 2027 from Okanjande in Namibia, which has M&I resources of 1.6Mt, following a capital spend of $34.6 million. The company aims to develop a downstream battery anode material plant in Baie-Comeau in Quebec.

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News

CURIMBABA GROUP



Pictured above is Curimbaba's Elfusa Geral de Eletrofusão Ltda facility.

It's always a pleasure to visit with Leonardo Curimbaba of the Curimbaba Group and carve out some time to discuss not only the overall condition of the global metals and minerals industries, but to get an update on Curimbaba activities. After all, the Curimbaba family involvement in producing fused minerals dates to 1961 with its initial bauxite mining and processing venture. Over its 60 -year plus history, the group has proven that due to judicious ownership and acute business management, one can not only survive difficult times but grow and prosper. With over 300 million tons of mineral reserves and deposits, this colossus company remains arguably the most interesting privately owned company in this business.

The company is currently focused on the foundry and proppant businesses for the sintered products, and refractory and abrasive business for fused products. It has been using its abrasive grade bauxite to produce high quality ceramic sand for molds in the foundry industry and for high performance ceramic proppant.

On the other side, the group is facing issues associated with the tariffs the U.S. POTUS placed on Elfusa products and even Mineração Curimbaba products in the US. Keep in mind, the U.S. is one of the main destinations of the Curimbaba Group with three (3) significant distribution points, namely USEM in Pittsburgh and Buffalo and Sintex in Houston. Needless to say, the tariffs can affect the overall performance of the group in a portion of 2025 and certainly in calendar year 2026.

Leonardo said, "The Brazilian domestic market is facing high interest rates (15%) that slowed down the economy and pushed back any significant investments. Therefore, refractory and abrasive markets, for instance, are in slow pace."

Leonardo added, "A good alternative to the U.S. market is the EU once the anti-dumping duties for fused products from China is fully implemented. Once that occurs, non-Chinese producing companies like Elfusa can add even more value to fused products consumers."

As Leonardo told ***SiC & More*** in an interview for issue #107, "Curimbaba continues to invest in research and development, seeking new growth opportunities and consolidating its position as one of the main industrial groups in Brazil."

US SEEKING MATERIALS BOTH FAR & WIDE

By Paul Harris

An aspect of US policy that is being rolled out worldwide, which, in a recent whitepaper, Juan Ignacio Guaman, at Chile's GEM consulting company called, Friends with Ore Benefits. In it. Guzman reflects on the growing number of bilateral agreements to reduce dependency on China and to diversify supply. Guzman said:

"Throughout 2025, the US has stitched together a flurry of bilateral frameworks and memoranda to secure [critical minerals]—chiefly with Australia and Japan, and with Malaysia, Thailand, Cambodia and Vietnam across South East Asia, plus Ukraine. The numbers suggest the strategy could move the dial—on paper, but turning signatures into shovels, and ore into oxides, is another matter. Processing remains the Achilles heel. Much of the midstream still runs through China, and political risk is real. Commitments inked in 2025 must survive elections, coups and commodity cycles."

Guzman suggests that the US aligning with other mineral-rich nations means "optionality, not market share. A memorandum of understanding is not a mine permit. A framework is not a flow of concentrate. A peace communiqué is not an offtake contract," he said.

Crucially, even when ore exists in friendly ground, he said the chokepoints are often still in China. "China refines the bulk of graphite, processes most rare earths, and dominates key intermediates in nickel and cobalt. Southeast Asian MoUs help with siting midstream plants. Japan's framework strengthens downstream magnet and cathode expertise. But until US-aligned firms build more processing capacity and long term offtake contracts, China's midstream market power endures," he said.

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MINE TO MAGNET REE PLAN SETS ACLARA APART – PART 2

By Paul Harris



Pictured above is the Aclara pilot plant located in Goiania.

Part one of this article appeared in ***SiC & More*** issue #109 where Paul outlined the importance of rare earth elements and interfaced the dynamics of Brazil and Aclara Resources. Part two begins with the Pilot Plant then focuses on Market Opportunities, Capital Concerns, and Capital Availability.

Pilot plant

The site visit included the 2tpd pilot plant in Goiás state capital Goiânia, which operated for a couple of years in Chile before being relocated to Brazil earlier this year. The pilot uses existing off-the-shelf equipment used by other industries to provide proof of concept that Aclara can produce rare earth oxides from Carina and Penco material.

ROM material is washed in ammonium sulphate to reduce the pH and break the ionic bond that holds the REE to the clay to facilitate ionic exchange. The -1mm material is thickened to increase its solids content and then filtered in a filter presses to separate the clay and produce a pregnant REE solution. This solution passes through precipitation and purification steps to remove impurities such as uranium and thorium. Some 95% of the water will be recycled, as will the ammonium sulphate reagent.

Aclara has patents on the desorption process, the water treatment facility and the filtration and impurities removal processes. It is also using artificial intelligence to expedite the chemistry calibration of the reactors, working with Hatch and Standford in this regard.

"We process in a controlled environment to get higher recovery. We are not taking the entire deposit, only the ionic-bounded rare earths that are easily dissolvable. 40% of the REE are in the ionic part, and we recover over 90% of that. The desorbable portion is 500ppm of a 1,500 ppm resource grade, which is why some people think our recovery is low, but we are not processing all that material.

The end product is a pliable white material like fudge that Aclara ultimately plans to use as a feedstock for a separation plant it wants to build in the US within its vertically integrated mine-to-magnet strategy. The pilot plant produces about 1kg of REE oxide from 1t of ROM ore. It has processed 80t of ore and obtained 74kg of product to date and expects to have 100-150kg this year to send for separation testing. About 1kg of the product contains about 400g of TREO. Of this 20-25% are LREE and 4-5% the HREE Aclara is focused on.

The company is undertaking a study in the US to determine locations to build a commercial separation plant, ideally one where there is a chemical industry with a chlor-alkaline plant. This would ensure the necessary reagents, such as sodium hydroxide and hydrochloric acid, would be on hand with minimal logistical challenges.

In the meantime, it is planning a pilot plant. "We are working to install a pilot plant for separation in the US before year end. It will likely be in Virginia in partnership with Virginia Tech University, which has a well-known materials and natural resource department," EVP Jose Augusto Palma told *SiC & More*.

In addition to separation, Aclara also aims to develop a metallization stage to produce alloys for the permanent magnet industry. Aclara strategic shareholder, Chilean iron and steel company CAP, has experience in developing alloys and is assisting with the R&D effort, including

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making its steel engineers available to participate in a dedicated research team founded a year ago. Aclara also entered into a strategic alliance with Germany's VAC Vaccumschmelze with an eye on magnet production, "which is helping define the specifications and quality thresholds we need to produce to be successful," said Nagato.

Market Opportunity

Aclara is focused on producing the HREE dysprosium and terbium (Dy-Tb). The USGS states that Dy-Tb are the most supply constrained REE and have most supply risk, with China adopting a policy of exporting magnets and not heavy REEs and potentially stopping the export of magnets too. The company is targeting production of 241tpa before 2030, which it estimates is 16% of Chinese production. "This is enough to satisfy 50% of US auto demand in 2030 and 100% of US defense industry demand," said Palma.

As in other critical mineral sectors, China dominates REE processing, and, in addition to sourcing ionic clays domestically, it processes material from Vietnam, Loas and Myanmar. In 2023, China supplied an estimated 3410t of Dy-Tb, with another 1591t in unofficial production, possibly from its neighbours. In 2030, Dy-Tb demand is estimated to increase to 6842t, which means a 3432t supply gap could open. "China has seen 11.2% annual growth in LREE but it hasn't been able to increase its HREE production. China consolidated its HREE production companies in 2022, but the Dy price has been falling since then which is counterintuitive, so it must be to limit new entrants," said Nagato.

Argus reported that incentive pricing was $384/t in 2022, $331/t in 2023, and is forecast to be $515/t in 2028 and $1340/t in 2033.

With the West's HREE vulnerability increasing, Aclara believes there is strong bipartisan support in the US to achieve REE independence, while the European Union is putting policies in place to stop China dominating, such as rules that no more than 65% of REE imports should come from a single country. This environment has led Aclara to state its value proposition as being a non-China source of HREE. "Making material only available for the US, Europe, Japan and South Korea is a differentiating factor," said Palma.

Capital concerns

New sources of production in low-volume mineral markets can cause severe price destruction in the near term, as lithium investors have experienced in recent years. China has built a dominant position in many mineral commodities over the past 30 years by bringing excessive production online, which destroys pricing and forces competing sources out of business. The West may need alternative sources of REE, but will pricing sustain new entrants? "There are huge volumes of overproduction of some REEs that need to have an international market as an exit for that material. If you bring supply to market, can the market accept it and what will the price response be? ... Juniors may have critical minerals in their deposits, but the amount of infrastructure to be financed and the availability of the technical knowledge to extract and process them is limited. There is a lot of risk for small reward," said Merriman.

US initiatives may help overcome both the cost of capital advantage China's mineral producers have enjoyed, and the price destruction that has followed, to enable Western producers to survive. The DoD deal with MP shows the US is prepared to pay to gain access to REE's, which will help overcome some of the cost of capital issues. It also works on the pricing issue as the DoD deal included floor pricing at twice the current market level, with the agency to pay the difference between $110/kg for neodymium and praseodymium (NdPr) and the market price. "This benchmark is now a new centre of gravity in the industry that will pull prices up," Ryan Castilloux, MD of consultancy Adamas Intelligence told *Reuters*.

"American stakeholders may be willing to pay a premium and provide the financial and technical support needed to secure these strategic minerals. Under such conditions, the factors that have held back Brazil's production could begin to fade. Could the moment finally be arriving for this South American giant to awaken?" said Faúndez.

REE pricing is opaque and a chimera, with spot pricing believed to understate reality. "Bank analysts report there is a four-times premium above spot for dysprosium and terbium," said Nagato. "We have tried to buy

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product for testing and we cannot buy separated oxides at spot price, or any price," said de Castro Ferreira.

Pricing is part of the dialogue Aclara has begun with US government agencies. "We have spoken with the US government and said that this is where we need help, and that we may be willing to transfer the benefit of a lower cost of capital to US industry for a period of time, but first we need to exist. The concept of a price floor has been floated and is becoming a reality with MP. It is a signal of the willingness of the US government to do what it takes to create a market for a new industry to flourish," said Palma.

Paying above market pricing is not such an issue for price inelastic defense companies who need the performance HREE provide. However, automotive, the largest demand sector, is highly price elastic and most price sensitive. Aclara said it is working on the pricing issue by educating automotive companies on the value HREE's provide their products. Without sustainable pricing, there is no business even if government grants can subsidise capex. Hence, Aclara talks about *value in use*.

"The Dy value in use in an EV varies from $2000 to $6000 in the battery set up, which doesn't include any value allocated to power or torque improvement. This is not fully captured in price discussions. An EV without heavy REEs will not perform well, particularly at higher temperatures. The Dy content in an EV is about 1-3%, so 20-60g per car at an estimated cost per EV of $5-15. There is room for a cost increase," said Nagato.

Other REEs consumers, such as those in Japan, may also be open to paying premia to help establish non-Chinese supply. Other potential funding sources include Brazil's BNDES bank, which in 2024, together with Vale, said it would create a R$1B critical minerals fund. The EU, Chile and potential consumers are other potential sources.

Capital availability

Government grants may or may not materialise for Aclara, however unlike other junior developers, it has a core group of dedicated shareholders in Hochschild Mining and Chilean iron and steel company CAP, that are both mining and industrial, long-term players, "and not the traditional junior miner looking to develop and flip," said Palma. Prior to becoming EVP in 2024, Palma was Hochschild's board member at Aclara and VP legal & corporate affairs.

Palma and representatives from CAP, who were also on the site visit, indicated their intent to continue funding Aclara into production.

Aclara was originally a subsidiary of London-listed Hochschild as a result of the ionic clay rare earth deposit in Chile for $56.3M, now known as Penco. When it did, it retained a 20% stake and Eduardo Hochschild 38%.

CAP came into the picture with a C$29.1M strategic investment into Aclara's Penco Module asset in three tranches in March 2024,January 2025 and January 2026. Its initial investment allowed them to acquire 20% stake on the Penco Module. In February 2025, CAP participated in a $25M equity financing for Aclara Resources (listed company) at a 41% premium and acquired 10.2% ownership. The three entities own 67% of the company. Aclara has invested over US$200M to date and has about US$$40M in cash, "which allows us to navigate until we are closer to a final investment decision at Carina," finance director Gustavo de Castro Ferreira told *SiC & More*.

The intention of Hochschild and CAP to take Aclara into production means they are likely to underwrite the $1.3B estimated PEA capex, which includes $600M to develop the Carina mine and plant in Brazil, and $129M for the Penco mine in Chile, with a production start in 2028. A six-month ramp-up would see the mine hit full production in 2029, with 2030 to be the first year of full production. The capex also includes $350M to develop a US separation facility with a start in 2029-2030.

"The pain point is having certainty of demand at a price that incentivises the project, which we need to formalise in offtake contracts. If some customers support us by advancing some of the capital, that is even better. In Brazil, we see movement to invest in critical minerals and REEs. A listing in the US also makes a lot of sense," said Palma.

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News

GLOBAL SIC: SUPPLY/DEMAND & PRICING



Pictured above is a large U-Shaped SiC furnace

We begin this lecture by confirming that the U.S. reciprocal tariffs, specifically the IEEPA "fentanyl-related" tariffs on Chinese products, including SiC, were dropped from 20% to 10% effective November 10, 2025. The reduction is set to remain in effect for at least one year unless extended or revised.

While corresponding with others in the global SiC industry, most believe that the evolutionary process that saw tens of thousands of tons of production shutdown in the "west" is still alive and well. Since 1980, or even 2000, the SiC landscape has changed so dramatically that it appears a Tsunami swept over the globe. That Tsunami is still hard at work and SiC production outside of Asia continues to shrink.

We opened issue #109 writing that we believed, over the last 30-60 days, that the SiC landscape had calmed considerably as virtually everyone associated with SiC's end-use markets had, for the most part, rationalized supply and price.

In issue #109, we also included comments from a processor of SiC who shared his views about supply and demand when he said, "After watching people rush to beat potential Trump tariffs, while business was seemingly slowing down, I was fearful that many of us would have excess inventory of both feedstock and finished goods. That situation would lead to a slowdown in ordering, which would result in supply pipelines drying up. Most of us remember the 2021/2022 run-up in pricing caused by COVID when we let our supply pipeline go empty. Prices went to record levels. There are days when I wonder if the next six months are going to be another calm before the storm."

As one observes SiC production continuing to dwindle in the west, and dependence on Asia increasing year over year, it's somewhat predictable what will happen to global SiC pricing once China's economy recovers. China's nominal GDP has grown only 3.7% year-over-year, which indicates weak pricing power. Apartment prices are down 40% compared to the peak numbers in 2021. Local governments have high debt. A key issue for SiC is that China's crude steel output is forecasted to fall below 1 billion tons in 2025. This would represent a 2-5% year-over-year decline. The property sector slump is expected to continue to affect apparent consumption of steel. Real estate investment was down almost 11% in early 2025 and that drags down construction activity. Beijing continues to push steel output cuts to control inventories and pricing. Construction output in 2025 is also down from 2024. Pig iron output, which has a direct relationship to iron and steel production, was down 2.3% in 2024 and estimated to be down another 1.2% in 2025.

Considering China produces almost as much steel in a month than is produced in the U.S. in one year, one can quickly grasp how a spike in metals and minerals demand in China can affect global prices.

SiC prices were expected to be flat for Q4 2025 and that is apparently the case. There are pressures in China to increase prices for Q1 2026, but that has been the case for over 30 years. Energy prices have trended down in China during 2025 and SiC inventories are basically in balance. Pet coke and anthracite have increased in price but the effect on SiC pricing is negligible. There will be efforts to manipulate currency, which could be the primary impetus for an increase in export prices.

Chinese producers and traders are currently attempting to increase abrasive grade products by about $25 m/t and metallurgy/refractory by approximately $30-40 m/t. With supply either in balance or slightly exceeding demand, most doubt that the increases will stick.

Ultimately, unless something unusual were to occur, prices should remain flat during Q1 2026. However, end-use markets in EU and North America are likely to continue to experience price increases for at least the next six months due to the overhang in both 20% and 10% tariffed inventory on Chinese SiC.

As we say at ***SiC & More***, we cannot predict the future of SiC pricing, but we feel reasonably certain that prices in Q1 2026 are likely to be a mirror image of Q4 2025. We also pay heed to the processor who feels a storm is brewing and that the industry could be experiencing a lull before the storm.

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News

BFA, MgO & MORE

Not much has changed in recent months regarding supply and demand for MgO or the market price. As of this publication, a select number of MgO manufacturing facilities in China had been closed, which has at least put a temporary halt to mounting inventories. The driving force between supply and demand, however, remains the fact that there is significantly less demand for either dead burned or fused magnesite specifically in China but still a global affliction. One flicker of hope for fused MgO producers was that FM97 increased in price by $10 m/t during late November. DBM90 remains the best-selling dead burned product, but prices are flat. Recent efforts to increase prices have gone nowhere.

For many years the issues associated with magnesia pricing have centered around China who dominates global output to the tune of 70-80% of natural magnesia. The market is concentrated with five (5) companies holding a 40-45% share with Chinese companies obviously dominating the volume. Although Japan and several Western companies tend to lead in high-purity specialty grades, the large tonnages that we talk about in ***SiC & More*** are dedicated to refractories.

Brown fused aluminum oxide is in a similar bracket as MgO. Global demand is flat, however, like MgO, China's domestic demand is as low as it's been in years. Demand is flat but the cost to produce a ton of BFA has increased. Pricing, on the other hand, has moved up only $10 m/t and that was during early November. As of November 10, 2025, the tariff on Chinese BFA crude was 17 ½%.

The sourcing options outside of China are thin. According to reliable sources, China represents as much as 70-80% of the world's brown fused production. In addition, China is believed to have furnace capacity of nearly 2,000,000 tons per year through 54 different smelters but operating at an anemic capacity utilization of approximately 35%. As a trader said, "I cannot predict pricing on BFA for 2026, but I suspect based on China's demand and the low production levels along with decent crude inventories, that pricing will be basically flat."

In issue #111 of ***SiC & More***, we will elaborate on the effects of kWh costs when producing products such as Al2O3 and SiC, and how the artificial intelligence craze could further exacerbate an already tenuous situation.

ARES Strategic Mining: Vancouver, B.C. 12/5/25

Ares Strategic Mining Inc. (CSE: ARS) (OTC: ARSMF) (FRA: N8I1) is pleased to provide a comprehensive update on the construction and operational advancements across its Lost Sheep Fluorspar Project in Juab County, Utah. These developments mark critical progress in bringing North America's only permitted fluorspar mine into full-scale industrial production.

Over the past weeks, Ares has completed major milestones underground and above ground, advancing both mine readiness and plant infrastructure in tandem.

These developments represent the final critical underground components needed to begin sustained and continuous production. James Walker, CEO of Ares Strategic Mining, commented: "This wave of construction and underground progress marks a major turning point for Ares. We now have the physical and regulatory infrastructure in place to begin industrial-scale mining. Every pad, bolt, weld, and fan gets us closer to delivering fluorspar to a market that desperately needs it."

With each completed task, the Company moves closer to a fully operational processing facility capable of delivering high-purity fluorspar to U.S. industries.

About Ares Strategic Mining

Ares Strategic Mining Inc. is a mining company focused on the development of its fluorspar projects in the U.S. The Company aims to become a significant supplier of high-grade fluorspar to North American markets, supporting industries vital to modern technology and infrastructure.

- Lost Sheep Fluorspar Project – Delta, Utah
- 100% owned – 5,982 acres – 353 Claims
- Located in the Spor Mountain area, Juab County, Utah, approximately 214 km south-west of Salt Lake City.
- Fully Permitted – including mining permits.
- NI 43-101 Technical Report identified extensive high-grade fluorspar with low levels of impurities.
- Mining plan approved by BLM

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News

BRAZIL: BOOTS ON THE STREET WITH FRANCISCO BATISTA

No doubt, Francisco personifies the "boots on the street" phrase as he has a unique frontline presence when it comes to energy, politics, economics, and commodities and never disappoints the readership with his astute observations and forecasts.

a) Energy: The current rainy window started with lower than expected rainfall volumes especially in the Southeast region. Current market prices increased from the previous report reflecting the lack of rainfall. 2026 is now traded at R$250/MWh ($46/MWh), while 2027 is at R$220/MWh ($40/MWh). La Niña is now in full effect and shall persist until Jan26, when rainfall is expected to return to normal levels throughout the country. Brazil is facing the same old paradox of having an excess in energy generation capacity (especially coming from solar and wind) at the same time it has a shortage in transmission capacity to spread this excess across the country. It is resulting in record high level of wind and solar generation curtailment in the northeastern region of Brazil while the southeastern region is constantly reaching its maximum generation capacity during peak-hours. Just another example of the poor planning capacity of this and the previous administrations. On top of that, specific lobbies keep increasing subsidies for wind, solar and even coal generation, making the final cost of electricity for end-users in Brazil one of the highest in the world.

b) Commodities: Electric energy is becoming a factor on overall competitiveness of commodity producers in Brazil as previous low-cost energy contracts are expiring, exposing these intensive consumers to a much harder reality. To exacerbate that situation, worldwide demand is softening and China is dumping materials at a faster pace than usual across the globe particularly in steel and alloys. Brazilian producers are still seeking for anti-dumping measures against made in China commodities while facing the challenges of CBAM enforcement in Europe which will be enforced on January 1st, 2026. Mining in the other hand is having a positive moment in Brazil with billions of dollars recently announced in new investments for Iron, Copper, Nickel, Gold, Bauxite and especially Rare Earths.

c) Politics: The most recent POTUS decision regarding tariffs over Brazilian products has been reversed almost entirely from the initial 50% burden. Coffee, fruits, cocoa and beef have just had their tariffs reduced to zero as a clear indication of their importance to US consumers. After all the latest tariff reductions it became clear that POTUS' strategy for Brazil was inefficient to say the least. The initial tariffs imposed by July 2025 had a direct relation with the alleged political witch hunt against former president Bolsonaro and the interference of the Brazilian justice system over Big Tech's activities in Brazil. Five months later the result of this movement is that tariffs are back to what it always was or even lower, former president Bolsonaro is now formally serving its sentence in prison, and nothing has changed in how the Big Techs operate in this country. In terms of internal policy, Lula has reached a ceiling on approval ratings and is now facing another relevant challenge related to public safety. For example, take the recent event in Rio de Janeiro, when a Police Special Force Unit hunted down drug lords entrenched in the city's slums, which ended up with hundreds of deaths including four policemen. Most of the population supported the police initiative while Lula and its administration condemned it. In addition, Lula is imposing its will on naming the next member of the Supreme Court which contrasts with the preferred name of the chairman of the congress. This episode created a war between congress majority and Lula's administration with consequences yet to be seen in the near future.

d) **Macroeconomics:** Brazil's GDP grew approximately 2% in the third quarter of 2025 driven by agribusiness, mining, and technology sectors, while domestic consumption remained stable only because it was heavily supported by income transfer from federal policies. The federal deficit remains the biggest challenge for the current administration especially for 2026 when Brazil will hold general elections and politicians will certainly expand the use of public funds for personal benefits. The Central Bank is doing a good job in keeping inflation under control even in this increasing deficit scenario, but it comes at the price of an extreme high tax rate of 15% that represents a real tax rate (tax rate minus inflation) of 10%. Stock Market is following closely the S&P performance and exchange rate is stable around R$ 5.4 per dollar. No one is expecting any relevant reform to take place in 2026 but at the same time everyone knows that next administration (starting in 2027) will have to make major reforms and cut federal expenses aggressively to bring the federal budget back to a sustainable path before tax rate can be cut down below the 10% threshold that is needed to attract investments to the country.

FOCUS projections are now:
Interest Rates: Dec/25: 15.00%; Dec/26: 12.00%.
FX Rates: Dec/25: R$ 5.40; Dec/26: R$ 5.50.

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METALS INDUSTRY UPDATE

DEERE & COMPANY

For fiscal year 2025 Deere worldwide net sales were approximately $45.68 billion with net income coming in at just over $5 billion.

John May, Chairman and CEO of John Deere said, "Looking ahead, we believe 2026 will mark the bottom of the large ag cycle," May stated. "While ongoing margin pressures from tariffs and persistent challenges in the large ag sector remain, our commitment to inventory management and cost control, coupled with expected growth in small agriculture & turf and construction & forestry, positions us to effectively manage the business and seize emerging opportunities as market conditions begin to recover."

VOLVO

Volvo Construction Equipment will invest about $73 million to build a new crawler-excavator assembly plant in Sweden aimed at meeting rising European demand. The facility will assemble up to 3,500 machines per year. Groundwork is expected to begin the first half of 2026 with production planned for two years of the start of the project.

TOYOTA

Toyota has announced the start of production at its only U.S. battery plant Liberty, NC. The nearly $14 billion plant will be home to 14 battery production lines and will eventually create up to 5,100 jobs. The plant will develop and produce lithium-ion batteries needed to support its battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), and plug-in hybrid electric vehicles (PHEVs). The facility currently ships HEV modules to Mazda Toyota Manufacturing in Alabama and Toyota Kentucky.

STELLANTIS

Stellantis recently announced plans to invest $13 billion over a four-year period with the objective of raising U.S. vehicle output by 50%. Stellantis produced about 5.4 million vehicles in North America in 2024, including Canada and Mexico. The largest investment will be a $600-million plan to produce the Jeep Cherokee and Jeep Compass vehicles for the U.S. market by 2027.

MACHINE TOOL ORDERS

Machine tool order statistics have been considered one of the leading major indicators for the health of the manufacturing sector. This is particularly the case for capital-intensive and durable goods industries. Orders of new machine tools totaled $538.9 million in October, a 9% increase from September. October 2025 total is over 40% higher than same month in 2024. YTD October 2025 is at $4.47 billion, which is up 19.7% compare to the same period in 2024.

CHINA CAR SALES

According to Reuters, China's annual car sales dropped 8.5% in November in a second straight monthly decline, for their biggest fall in 10 months, data showed on Monday, amid a waning scramble to buy vehicles before government subsidies dwindle at year-end. Car sales in the world's biggest auto market stood at 2.24 million last month, following October's slide of 0.8%, according to the data from the China Passenger Car Association.

WALTER SURFACE TECHNOLOGIES (WST)

WST recently announced that it had acquired coated abrasives producer Hermes' North America. WST, based in Montreal, will bolster its position in key markets including belted products, which are commonly used in finishing automobile applications.

THYSSENKRUPP

Thyssenkrupp's recently announced that the steel business unit would temporarily idle production of electrical steel production in Europe due to cheap imports from Asia. The Thyssenkrupp electrical steel plants in France and Germany will be idled from mid-December to the end of the year.

U.S. TRADE GAP

In September, at $52.8 billion, the U.S. trade gap fell 10.9% to its lowest level since 2020. Exports rose 3.0% to $289.3 billion while imports edged up 0.6% to $342.1 billion.

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GRAPHITEHUB: FROM THE HEART OF THE GRAPHITE MARKET: Key Developments

by Harry Minnis



Harry Minnis founder of GraphiteHub.

Graphite Market Update: Key Developments

The past few months have marked a noticeable shift in the graphite landscape.

From trade tensions to shifting policy, increased government support, and project level developments stacking up, it's been a dynamic period for the industry, all unfolding against a backdrop of weak pricing and poor market sentiment.

In October, China announced a new set of graphite export controls that would require export licences for artificial graphite, mixed anode materials, furnaces, coating materials, and process technologies used to produce them. The measures were to take effect from 8 November 2025. However, on 7 November, China suspended the rules for at least a year. The move was widely interpreted as a political concession amid US-China trade discussions, but it reinforces China's position that it can adjust access to critical materials at any time.

But on the back of these tensions, the United States has moved to strengthen alliances with trusted partners, highlighted by the US-Australia Critical Minerals Framework signed in October. The agreement commits both governments to provide at least US$1 billion each within six months to support critical minerals mining and processing projects. It targets a US$8.5 billion pipeline of priority projects across both nations. Graphinex, an Australian graphite company, emerged as a winner of the strengthened partnership, securing a US$860 million EXIM Bank Letter of Interest to advance its project.

Also notable was POSCO Future M's record~US $470 Million natural graphite anode contract with a major US automaker in October, covering supply from 2027 -2031 with an option extending to 2037. On the back of this, POSCO Future M also confirmed plans to eliminate Chinese intermediates by 2027– a major step in Korea's push to build a China independent anode supply chain.

Canada has stepped up its backing for domestic graphite and anode material projects, mirroring the US's push for low risk regional supply. Recently, the government designated Nouveau Monde Graphite's Phase 2 Matawinie project as a "Major Project of National Interest" and signed a strategic offtake term sheet for 30,000 tpa of graphite concentrate.

We're expecting December to be busy, with the final determination in the U.S. antidumping and countervailing duty investigations into Chinese active anode material currently scheduled for 5 December 2025. The process is running in parallel with broader Section 231 trade action reviews, but with the recent U.S. government shutdown creating backlogs, delays remain possible.

Although the past few months have seen heightened activity across the graphite sector, much of this momentum has been short lived, with equities quickly giving back gains as the broader market waits for more concrete signals. Yet one thing remains clear that despite short term volatility, long term demand for secure, non China graphite supply continues to build. True to its name, GraphiteHub is quickly becoming a hub for everything graphite-related. You can explore more at graphitehub.com and also follow along on LinkedIn.

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WOLFSPEED

Wolfspeed has announced that Toyota will integrate its silicon carbide metal-oxide-semiconductor field-effect transistors (MOSFETs) into onboard charger systems for the Japanese automaker's battery electric vehicles (BEVs), with the components designed to support enhanced power efficiency and reduced charging times for electric vehicle owners. The silicon carbide device adoption reflects Toyota's confidence in Wolfspeed's ability to meet rigorous automotive quality and long-term reliability standards, with the US-based semiconductor manufacturer's domestic supply chain providing production stability for the partnership.

Silicon carbide technology in onboard chargers enables higher power density and more efficient power conversion, resulting in shorter charging times, minimised energy loss and improved driving range for EV owners. The semiconductor material is becoming an industry standard for high-voltage onboard power systems in electric vehicles.

In a statement, Robert Feurle, Chief Executive Officer of Wolfspeed, said: "Toyota is known for its uncompromising approach to quality and reliability, and we're honoured to be supporting their next wave of electrification. Wolfspeed's US-based supply chain and domestic silicon carbide manufacturing footprint ensure the stability and continuity they need to achieve their electrification goals."

Cengiz Balkas, Chief Business Officer of Wolfspeed, added: "Our work with Toyota is built upon years of trust in engineering expertise, supply reliability, as well as a shared obsession with quality. This reinforces our role in driving electrification with silicon carbide technology that delivers performance, efficiency and safety."

WHAT'S THE BIG DEAL?

There is so much talk about SiC and its shift away from the typical abrasives, refractory, and metallurgical applications to higher-end strategic markets such as semiconductors. The semiconductor industry requires SiC that is known as 4H-SiC and 6H-SiC. In general, this means that the SiC content is typically 99.9995%, or often called "6N". So, when one is reading about single-crystal substrates, epitaxial layers, polycrystalline source material, remember that this is not your father's SiC that goes into grinding wheels, sandpaper, refractory bricks, or iron/steel production.

So, what's the big deal about SiC in the semiconductor application? Simply put, SiC tends to outperform traditional silicon. Why?

- SiC has a wider bandgap; 3.2 eV vs silicon at 1.1 eV
- SiC has three times higher thermal conductivity.
- SiC has higher breakdown voltage.
- SiC has better frequency switching.
- SiC has lower power losses and higher efficiency.
- SiC has 40-70% lower switching losses.
- SiC has superior mechanical strength.
- SiC has improved high-temp performance.

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ZAPORIZHABRASIVE ALUMINUM OXIDE UPDATE AND FORECAST



Aluminum oxide ingot being pulled from vessel and ready to be cooled.

SiC & More has closely followed activities at Zaporizhabrasive (ZAP) dating back to when this newsletter was first launched in 2003. Additional emphasis, however, has been placed on ZAP and its activities since the Russian invasion of Ukraine in February 2022. Despite the horrendous conditions, including many thousands having been killed and millions displaced, ZAP continues to persevere.

In issue #109 of ***SiC & More,*** we pointed out what we believe might have been seven (7) things readers probably didn't know about ZAP. This segment will focus on success at the Ukrainian aluminum oxide side of the facility during 2025 as well as a forecast for 2026.

The year 2025 became a pivotal stage for Zaporizhzhia Abrasive Plant in strengthening Ukraine's position on the European market of Brown Fused Alumina (BFA). Following the completion of the European Commission's anti-dumping investigation AD720 and the introduction of duties on imports from China, Europe officially identified Ukraine as one of the key alternative suppliers. According to the Commission's documents, the EU expects imports of BFA from other countries to recover to the 2021 level (83,793 tons per year), stressing that stable supplies from reliable sources are extremely important to the EU's economic and industrial security.

The transitional period of 2026–2027 creates a strategic window of opportunity for Ukraine, and Zaporizhabrasive is ready to play a leading role in this process.

Today, the company operates an annual production capacity of over 45,000 tons and in 2025 began preparing to restart idle manufacturing lines. Within the next 12–18 months, ZAK can additionally supply up to 30,000 tons of BFA annually. This will allow the company to increase total output to 75,000 tons per year in the medium term, fully compliant with European standards (ISO 9001, CE, FEPA). Such capacity will secure stable BFA volumes for the EU market and help offset shortages following restrictions on imports from China.

In 2026, ZAK aims to significantly increase exports to EU countries, strengthen its market presence, and implement an investment plan focused on production expansion. The company calls on European partners and EU institutions to support this strategic project, which aligns with the European Union's industrial-security interests and contributes to strengthening Ukraine's industrial sector during wartime.

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HAVE WE CREATED A MONSTER?



Pictured above is St. Elmo Steak House, which is considered one of the most famous and historic restaurants in Indianapolis - often referred to as the city's signature dining institution.

This represents the sixth issue of ***SiC & More*** where we dedicated the last page to photos from a reader featuring wine, resorts, cigars, autos, watches, recipes, or restaurants. Although our staff is not overwhelmed by readers' photos, everyone at ***SiC & More*** is pleased with the response. Since the initial back page feature in November 2024 in issue #104, ***SiC & More*** has taken readers on a short tour of Napa Valley, cigar lounges in NYC and NOLA, Nashville, TN, Vinicola Guaspari in Brazil, and Plasencia, Spain.

SiC & More doesn't claim to be a lifestyle newsletter by any means, however, in issue #108 a reader commented, "When I read the back page, I had to refer to the front page to be certain I wasn't reading *Cigar & Spirits, Conde Nast Traveler, or Wine Enthusiast*. We considered that remark more flattering than we expected when we launched this little journey.

This back page features Indianapolis, IN home of the world-famous Indy 500 Auto Race.

Our own Marissa Decklin did a bit of research on Indy and came up with her own 10 little known facts about the "Crossroads of America".

- ***Indianapolis is also nicknamed "Amateur Sports Capital of the World".***
- ***The Indy 500 track is nicknamed "The Brickyard" because it was originally paved with 3.2 million bricks in 1909.***
- ***Home to the world's largest children's museum – The Children's Museum of Indianapolis.***
- ***Kurt Vonnegut was born and raised in Indy.***
- ***Home to Gen Con, the world's largest tabletop gaming convention.***
- ***Home to the NCAA headquarters.***
- ***Indy averages 25" of snow per year.***
- ***Indy's population of 887,000 is more than three times that of Indiana's next largest city, Fort Wayne and makes it the 16th most populous city in America.***
- ***There is a 38' tall statue of a shirtless Abraham Lincoln doing yoga that is titled "Aspiration".***
- ***The Indy 500 track used to have a golf course inside it; 14 holes outside the track and 4 holes literally inside the infield.***

Silicon Carbide & More

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